

Part II

Operation & Maintenance

Preface

Introduction

The Operation and Maintenance Support Information (OMSI) concept was developed to help activities operate and maintain selected facilities. OMSI manuals provide a comprehensive, organized library of data of as-built materials, equipment and systems and should be used as the first step in solving operation, maintenance or repair problems. We hope you will find that these manuals will save you time and expense. Your comments or suggestions are welcomed and should be forwarded to Commander, LANTNAVFACENGCOM, 1510 Gilbert Street, Norfolk, Virginia 23511-2699, Attn: Code 1614. Telephone (804)322-4647, FAX (804)322-4715.

Contents

The OMSI Manual consists of three parts. Part I contains Facility Information. This portion of the OMSI Manual contains useful information for the preparation of maintenance service contracts for the tenants of the facility.

Part II contains Operation and Maintenance Information (Preventive and Corrective) for selected systems requiring operation, maintenance and repair procedures. Each system discussed in Part II is divided into three sections: Operations, Preventive Maintenance, Corrective and Maintenance. Under each section, the manual provides extensive additional information such as emergency procedures, PM requirements, troubleshooting, etc.

Part III contains Product Data. This portion of the OMSI Manual consists mainly of construction contractor submittals related to the operation and maintenance of the systems. Part III can contain as-built materials such as manufacturer's catalog data, shop drawings, etc. The information in Part III is arranged by system, similar to Part II.

Updating

The OMSI manuals should reflect the facility's existing components. Therefore, you must continuously update this manual. When equipment is replaced, add pertinent new information to each manual set. Be sure to update all sections of the manuals that reference the replaced item. Purge all information on the replaced item to prevent future confusion.

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Part II: Operation and Maintenance

Part II provides specific information for the systems within the Central Energy Plant (CEP). For each system within Part II there is a separate chapter marked with a tab. At the beginning of each system there is a specific table of contents defining the sections within that chapter. Additionally, within each chapter there are tabs separating the sections for Operations, Preventive Maintenance (PM) and Corrective Maintenance.

The following are included in this section:

- **Table of Contents for Part II: Operation & Maintenance**
- **OMSI Drawing List**
- **General Safety Instructions**
- **Abbreviations & Acronyms**

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OMSI Drawing List

System	Name	Description
Part I	SITE-1	CEP Site Plan
	FL-1	CEP Floor Plan
	UT-1	CEP Utility Connection Plan
	R-1	CEP Roofing Details
Part II		
1. Steam System	ST-1	Steam System Flow Diagram
	ST-2	Steam System Location Drawing
2. Boiler Feedwater System	BF-1	Boiler Feedwater System Flow Diagram
	BD-1	Continuous Blowdown Flow Diagram
3. Condensate System	C-1	Condensate System Flow Diagram
4. Flue Gas & Combustion Air Systems	FG-1	Combustion Air and Flue Gas System Flow Diagram
5. Domestic Cold Water System	DCW-1	Domestic Cold Water Flow Diagram
	DCW-2	Domestic Cold Water Location Drawing
6. Domestic Hot Water System	DHW-1	Domestic Hot Water (DHW) Flow Diagram
	DHW-2	Domestic Hot Water (DHW) Location Drawing
7. HVAC System	HVAC-1	HVAC Location Drawing
	CT-1	Control Type 1
	CT-2	Control Type 2
	CT-3	Control Type 3
	CT-4	Control Type 4
10. Fuel Oil Systems	FOS-1	Fuel Oil System
	NG-1	Natural Gas System
11. Infectious Waste System	INF-1	Infectious Waste System Location Drawing
12. Fire Protection System	FP-1	Fire Protection System
13. Fire Alarm System	FAS-1	Fire Alarm System
14. Control Air System	CA-1	Control Air System
15. Distributed Computer Control System (DCCS)	CS-1	Boiler Controls
	CS-2	DCCS Plant Control Points
	CS-3	DCCS Overview

General Safety Instructions

The following safety instructions are provided as general guidelines for persons working on or around the Central Energy Plant (CEP). Safety instructions for specific systems and/or equipment are included in *Section 7: General Safety Instructions* for each system.

Work Areas

- \$ Keep work areas clean and free from obstructions and tools.
- \$ Keep fire exits and paths free from obstructions, well-lit and well marked.
- \$ Make sure work areas are well ventilated especially when using paint and lubricants.
- \$ Barricade and clearly mark work areas so that they do not pose a hazard to others.
- \$ Lighting in work areas should be covered to prevent accidental breakage. A minimum of 50 foot-candles of lighting should be provided in all work areas.

General Equipment Safety

- \$ Machinery and equipment should only be operated and maintained by personnel specifically trained for that equipment.
- \$ Belt guards and machine guards should be installed on each piece of equipment. If guards need to be removed for maintenance, replace immediately after completing maintenance.
- \$ Inspect electrical cords, pulleys, chains, ropes, etc. for damage. Repair before servicing machinery.
- \$ Use only ladders in good repair with a non-slip base. Do not use metal ladders for any type of electrical work.

Hazardous Substances

- \$ Store hazardous and/or flammable liquids in appropriately marked containers and cabinets.
- \$ If exposure to a hazardous substance is suspected, seek medical care immediately.
- \$ Use eye, ear, and head protection as required. Ear plugs should be worn at all times in the boiler and chiller rooms.

General Electrical Safety

\$ Do not perform maintenance on energized electrical lines or equipment except:

- When testing line voltage and/or current.
- Where deactivating power lines presents an immediate hazard to life.

\$ Use the approved lockout procedure (see below) to deactivate and de-energize electrical power prior to working on that piece of equipment.

\$ Use only tools specifically designed for electrical work.

\$ Electrical control panels and power panels should be provided with a clean unobstructed work area of 2 feet.

Electrical Lockout Procedure

\$ No person or crew shall perform work on or in close proximity to a circuit until:

- The circuit is properly de-energized.
- The senior person on the job has signed and personally attached to the opened switch a >Keep Out= or >Danger= tag. The placing or removing of these tags cannot be delegated to any other person.
- The senior person has personally tested the circuit at the point of work to positively prove that the circuit is de-energized.
- All precautions are taken to prevent accidental energizing of the switch.

\$ No person shall close a switch on which someone else has placed a tag until that tag has been removed by the individual who placed it.

\$ The tags shall remain in place until removed by the person who attached them.

\$ In addition to the tagging requirement, the senior person shall, where necessary, place a lock on the switch, in a manner that will positively prevent closing of the switch. This lock shall not be removed by anyone but the person who placed it there and not until all personnel are clear of the circuit and all >Danger@, >Do Not Operate@, >High Voltage@ and >Keep Out@ tags have been removed.

\$ In the event that the above mentioned senior person is unavailable or unable to remove his or her tag and lock: the tag and lock may be removed only by that individual's immediate supervisor. This supervisor must ascertain that all personnel are clear and that the circuit is clear before energizing.

Abbreviations & Acronyms

aka	also known as
amps	amperes
BHP.....	brake horsepower
bps	bits per second
BTU.....	British Thermal Unit
BTUH.....	BTUs per hour
CaCO ₂	Calcium Carbonate
CEP	Central Energy Plant
CFC	chlorofluorocarbons
CFH.....	cubic feet per hour
CFM	cubic feet per minute
CV	constant volume
GPH.....	gallons per hour
gpm.....	gallons per minute
H-O-A	Hand-Off-Auto
HEPA	high efficiency particulate air
Hg.....	mercury
HP	horsepower
Hz.....	hertz
KV.....	kilovolts
lab.....	laboratory
LWT	leaving water temperature
MBH.....	1000 BTUs per hour
MBTU	1000 BTUs
MCC.....	motor control center
MER.....	mechanical equipment room
MHZ.....	megahertz
N.C.....	normally closed
N.O.....	normally open
NO _x	nitrogen oxide
OMSI.....	Operations and Maintenance Support Information
psig	pounds per square inch, gage
RH.....	relative humidity
RO	reverse osmosis
RPM	revolutions per minute
SEQ.....	sequence
TAB.....	terminal air box
V	volts
VAC	volts, alternating current
VAV	variable air volume
VDC	volts, direct current